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of the State, and it will be a great pity if the public sentiment of the State is disregarded by its executive. A topographical survey of New York by one of the leading geographers of the country would be a model for other states to follow.

MICROSCOPY.¹

A FOREIGN VIEW OF AMERICAN MICROSCOPY. — Mr. Henry Crouch, the well and favorably known London optician of that name, who spent a considerable part of last summer at Philadelphia in the double capacity of a British commissioner and an exhibitor, improved the opportunity to become acquainted with many of our microscopists, and to study the various styles of instruments exhibited at the Centennial. His contribution on the subject, addressed to the Queckett Club after his return home, is of more than ordinary interest on account of his special and technical knowledge of the subject, his position as a fellow exhibitor, to which he candidly alludes as a peculiar feature in the case though not a motive to control his statements, his comparative independence of local sympathies and prejudices, and his evident feeling of good will and cordiality towards those whom he met while here. He heartily acknowledges the hospitable treatment received in this country, and intimates that a vacation spent here is a rare pleasure, a statement which elicited from the president of the club a hearty assurance of reciprocation in case any of our microscopists should visit London.

Mr. Crouch mentions with pleasure and surprise the interest and promptness with which the progress of microscopy in England is followed up in this country. He notices the large number of students of diatoms, due, he suggests, to the great abundance of the fossil deposits here, and the comparative unfamiliarity with other forms of pond life. He regrets, as we do, the absence from the circle of exhibitors of some eminent competitors for success in the same department of manufacture.²

The very general adoption of the Jackson form of stand in this country, which has always been a fact, Mr. Crouch regards as an encouraging confirmation of his uniform belief and practice; the continental model being used, as far as he noticed, only by those who employ the microscope in some narrow specialty, and for the most part without accessories. The same remarks would apply to the binocular, and they are certainly correct if the specialties be understood to include histology and pathology, for which many of the English and American accessories are not needed, or at least not popular. As further peculiarities of the

¹ Conducted by DR. R. H. WARD, Troy, N. Y.

² The opinion having been expressed in the *NATURALIST*, December, 1876, page 730, that the insinuation that Tolles' lenses were not exhibited at Philadelphia because they would not be properly examined there, must have been authorized without serious thought, Mr. Stodder desires the correction made that the reason given for withholding the lenses was not intended to be insinuated but distinctly stated in the case referred to, that it was adopted after mature consideration, and that he still considers it justifiable and proper.

American stands, he notices the greater prevalence than in England of stands having the limb supported by one pillar instead of two, though what happened to come before his notice gave a greatly exaggerated idea of the proportion of single-pillar instruments used here, the more general use of the [Zentmayer] glass stage, the general absence of a concentric stage rotation, except in the larger stands, the hinging of the mirror-stem for better managing oblique light, and the new plan of swinging mirror and substage together as now made by both Zentmayer and Gundlach. He mentions Zentmayer's new portable microscope very favorably, along with one by Ross, and claims the centring adjustment now used on the best stands as his own, though contested by two claimants here.

Of objectives he with very good taste hesitates to speak comparatively, adding a good-natured allusion to the well-known sensitiveness on this subject of makers, and the peculiar weakness of each for considering his own unquestionably the best in some important particulars. Subsequent discussion, however, drew out the opinion that the work of some American opticians was very good, and differed from others (abroad) only in some few peculiarities. He had seen some of Mr. Tolles' objectives which he had not found equaled elsewhere, though his impression was that he pushed the angle of aperture too far, and sometimes to the positive detriment of his lenses. Microscopes of the better class he believed were produced in America fully as good as in England, though at far higher prices. Micro-photography he finds more extensively cultivated here than at home, with an evident influence on the construction of objectives, especially in regard to the angular aperture of the higher powers, the advantage of which he thinks is at least questionable, and from his own recent observations he is inclined to believe that "there are other and important directions in which the energies of those engaged in the manufacture of objectives can be more profitably employed."

He finds the accessories exhibited of the usual character, and not calling for special remark, though he states that he has had "the pleasure of receiving many valuable hints respecting the improvement and modification of some of the accessories from Dr. Woodward, of Washington, Dr. J. G. Hunt and Mr. Holman, of Philadelphia, Dr. Ward, of Troy, and other microscopists," which he hopes to have an opportunity of carrying out and submitting to further notice.

The mounted objects by Mr. Walmsley, of Philadelphia, Dr. Beattie, of Baltimore, and Dr. J. G. Hunt, of Philadelphia are mentioned with praise; the vegetable preparations, transparent and double stained, by the latter person are regarded with evident enthusiasm as remarkable illustrations of vegetable structure mounted in an unsurpassed manner. Dr. Hunt's exquisite transparent vegetable preparations can hardly be better appreciated anywhere than here, but that they should now be regarded as novelties is almost incredible. When first produced many years

ago they were believed to be a large and important contribution to the progress of microscopy, but the methods worked out by Dr. Hunt were so unselfishly communicated, and the objects so liberally distributed and so largely studied and imitated, that they have long since become common property. Even the addition of double (vegetable) staining, systematized and rendered practically successful through the talented labors of Dr. Hunt and Dr. Beattie, is no longer spoken of as a novelty here.

In comparison, if not in contrast, with these criticisms by a practical foreign artisan may be noticed a critical paper on the same subject by a leading American botanist and philosophical microscopist, Dr. J. G. Hunt, just published in the *Cincinnati Medical News*. Dr. Hunt discusses American as compared with foreign microscopes at the Centennial.

The new Ross stands he considers superior to the old form in improved appearance, greater accuracy of motion, more steadiness with less clumsiness, and a binocular prism not moved by focusing, but the stage is considered still too thick, the change of power during fine adjustment a perceptible fault, and the finish only moderately good. Beck's large stand is considered the best of foreign make in form and finish, though defective in lacking centring adjustments to the rotating stage (which we think were added to some of the stands exhibited at the Centennial), and in want of durability in the stage movements. The stands by Mr. Crouch are considered excellent and durable, and successfully cheapened without sacrificing commercial good work. His claim of the adjustable concentric stage is denied in favor of Zentmayer who introduced it sixteen years ago. [Mr. Zentmayer undoubtedly introduced this adjustment long ago with a screw-driver movement, which he still prefers, while Mr. Crouch has more recently added milled heads so that it can be moved without tools.]

The Nachet stands are considered neither elegant, convenient, nor durable, and the Hartnack instruments, not exhibited, are rated as clever working instruments in a restricted way, but inferior to the English and American.

German instruments are not esteemed, and are scarcely considered instruments of precision at all.

Of American stands only Zentmayer's are specially discussed, and these are judged to be preëminent, being the best microscopical work on exhibition, and having no superiors anywhere. His "American Centennial" stand is considered superior in workmanship and design to any others in the exhibition or elsewhere.¹ The hinging of the bar which carries all the illuminating apparatus, including the mirror, at the level of the object on the stage so as to revolve around that object, is credited exclusively to Zentmayer, and stated to have been wanting in the Rochester

¹ The principal novelties introduced in the construction of this stand have been already specified in the *NATURALIST*. We heartily concur with Dr. Hunt that this is the best first-class stand yet produced in the world.

instruments exhibited at the *opening* of the exhibition. [It was certainly present in the Rochester instruments exhibited during the summer.] This would give the priority in this important improvement clearly to Mr. Zentmayer.

The so called student's stands are mentioned with the intimation that too many of them are unfit for use, and with an earnest appeal for better workmanship in their construction.

Objectives are discussed without restriction to those exhibited at Philadelphia. Indeed it would be hardly possible to say anything comprehensive about them otherwise, since Mr. Tolles' work could not be overlooked in such a discussion.

Mr. Wenham's patent lenses, in which corrections are obtained by a single flint lens, were considered to give great promise, but to be so unsuccessfully mounted as to compel a suspension of judgment in regard to them. Mr. Crouch's lenses were considered excellent and exceedingly fine for their cost, though without extraordinary optical qualities, strikingly resembling in corrections the Wenham lenses. Beck's lenses retain their character for excellent optical properties, being as nearly achromatic as possible without aiming at maximum angle. Their mounting, however, is poor in design and execution. The new Powell and Lealand one-eighth ranks highest of all foreign objectives yet seen, and marks a new era in English microscopy. It gives a bluish-green light, with sharp and accurate definition, and a good image to the edge of the field. The mounting is superb, and the American [Tolles'] plan of traversing the back combination is adopted.

The German objectives are not commended, the lower powers being judged unfit for use, and the high ones to fail in comparison with our lower powers. The brass work is considered inferior, and the lenses show a want of finger skill.

Of American lenses he speaks chiefly of those by Mr. Tolles, because those of other makers have disappointed him. He considers that there are greater optical possibilities in Mr. Tolles, in the construction of lenses for the microscope, than in any other maker. His lenses are often thought faulty because not understood. No two of them are alike, but this is due, he is satisfied, not to unequal execution, but to a special change in each case to obtain a higher degree of some particularly desired quality. Neither are penetration and resolution incompatible to the extent claimed by the theorists. Some of Mr. Tolles' lenses of extreme angle have a penetration so extraordinary that they form the best lenses known for histological work by central light, showing details with a brilliancy not otherwise seen. A recent Tolles one-tenth has the same power as the new Powell and Lealand one-eighth, but with clearer and more brilliant definition and greater penetration. It adopts the [Wales'] method of adjusting for wet and dry by the screw-collar, while the one-eighth has a separate front, a less convenient plan.

Dr. Hunt fears that micro-photography, especially that whose best results are obtained by oblique light, may temporarily retard the best construction of lenses for histological work which is not proven to be best accomplished by lenses specially corrected for obliquity. He thinks that our best lenses have optical capacities not yet fully developed, and that improvement in illuminating apparatus, particularly that for obtaining accurate central illumination, modified or concentrated at will, is more needed at present than further improvement in lenses.

Of microscopical objects he believes that the best work is always kept at home, and that with few exceptions we receive from Europe only what is unsalable there. The finest pathological work he has seen, at least that retaining the most structural details if not the most neatly mounted, was produced at the Army Medical Museum at Washington. In demonstrating and mounting botanical subjects, he considers this country immeasurably in advance of all others. He does not state (what should be stated) that this advance is very largely due to his own distinguished labors. Biological science, however, is not satisfied with microscopical slides, but turns to the living objects for a knowledge of structural details, and even the mounted preparations of the present and the future must show the whole structure of the cell, and not its empty shell, however beautifully displayed.

OBITUARY. — Died at Boston, Mass., on Monday, March 19th, Edwin Bicknell, one of the most genial of men and one of the most skillful of workers with the microscope. Outside the circle of his personal friends, among whom he was conspicuous for his cordiality and hearty good will, he was best known and will be longest remembered for his highly successful work in the preparation of microscopic objects. His slides, especially those of hard sections, have scarcely been equaled by any other maker. The exquisite slides which he sent out some years ago, by an arrangement with the Essex Institute of Salem, Mass., under the name of the Essex Institute Microscopical Works, have been followed ever since by an unbroken succession of excellent work.

SCIENTIFIC NEWS.

— From a recent letter from Dr. L. de Koninck, of Liège, Belgium, to Professor Hayden, we learn that the king of Belgium last year proposed a prize of twenty-five thousand francs to be awarded annually to the best memoir on the history of the country, its relations to foreign countries, sciences, etc., which prize even foreigners are allowed to compete for at certain periods on specific subjects. The king has also initiated an important movement toward the exploration of Africa. The subscriptions for this purpose are already quite large, and inspire the hope that strong aid can be given to the brave men who desire to devote